PRODUCT SPECIFICATION

FG6223ASRC

Wi-Fi Single-band 1x1 + BLE 4.1

SDIO/UART Combo Module

Version:v1.0

Customer: _____

Customer P/N:_____

Signature:_____

Date:_____

Office: 14th floor, Block B, phoenix zhigu, Xixiang Street, Baoan District, Shenzhen

Factory: NO.8, Litong RD., Liuyang Economic & Technical Development Zone, Changsha, CHINA

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FG6223ASRC Module Datasheet

	Part NO.	Description
Ordering Information	FG6223ASRC-01	RTL8723CS-CG, b/g/n, 2.4GWi-Fi+BLE4.1, 1T1R, 12X12mm, SDIO +Uart,dcdc,Unshielded cover

Target power:

2.4G: 17/15/15

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Revision History

Version	Date	Contents of Revision Change	Draft	Checked	Approved
V1.0	2024/07/18	New version	LXP	LXY	QJP

1. General Description

1.1 Introduction

FG6223ASRC is a highly integrated 802.11b/g/n 1T1R WLAN, integrated Bluetooth 2.1/3.0/4.0/4.1single chip. It combines a WLAN MAC, a 1T1R capable WLAN baseband, BT Protocol Stack (LM, LL,and LE), BT Baseband, modem, and WLAN/BT RF in a single chip. FG6223ASRC provides a complete solution for a high throughput performance integrated wireless LAN,and Bluetooth controller.

FG6223ASRC WLAN baseband implements Orthogonal Frequency Division Multiplexing (OFDM) with 1 transmit and 1receive path and is compatible with the 802.11n specification. Features include one spatial stream transmission, short guard interval (GI) of 400ns, spatial spreading, and transmission over 20MHz and 40MHz bandwidth.

1.2 Description

Model Name	FG6223ASRC
Product Description	Support Wi-Fi/BLE functionalities
Dimension	L x W x H: 12 x 12 x 1.8 mm
Wi-Fi Interface	Support SDIO V2.0
BT Interface	UART / PCM
OS supported	Android /Linux/ Windows
Operating temperature	0°C to 70°C
Storage temperature	-55°C to 125°C

2. Features

General

- 802.11b/g/n 1T1R WLAN and Bluetooth single chip

PHY Features

- 802.11n OFDM
- One Transmit and one Receive path (1T1R)
- 20MHz and 40MHz bandwidth transmission
- Short Guard Interval (400ns)
- DSSS with DBPSK and DQPSK, CCK modulation with long and short preamble

Host Interface

- Complies with SDIO 1.1/2.0 for WLAN
- with clock rate up to 50MHz(SDR25)
- GSPI interface forconfigurable endian for WLAN
- Complies with HS-UART with configurable baud rate for Bluetooth

Bluetooth Features

- Supports Bluetooth 4.0/4.1 Low Energy(BLE)
- Supports multiple Low Energy states

3. General Specification

3.1 WI-FI Specification

Feature	**Description**	
WLAN Standard	IEEE 802.11 b/g/n Wi-Fi compliant	
Frequency Range	2.400 GHz ~ 2.4835 GHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz：Ch1 ~ Ch13	
Test Items	**Typical Value**	**EVM**
Output Power	802.11b /11Mbps : 17dBm ± 1.5 dB	EVM ≤ -10dB
	802.11g /54Mbps : 15dBm ± 1.5 dB	EVM ≤ -25dB
	802.11n /MCS7 : 15dBm ± 1.5 dB	EVM ≤ -28dB
Spectrum Mask	Meet with IEEE standard	
Freq. Tolerance	±20ppm	
SISO Receive Sensitivity (11b,20MHz) @8% PER	- 1Mbps PER @ -91 dBm	≤-83
	- 2Mbps PER @ -89 dBm	≤-80

	- 5.5Mbps	PER @ -86 dBm	≤-79
	- 11Mbps	PER @ -84 dBm	≤-76
SISO Receive Sensitivity (11g,20MHz) @10% PER	- 6Mbps	PER @ -87 dBm	≤-85
	- 9Mbps	PER @ -86 dBm	≤-84
	- 12Mbps	PER @ -84 dBm	≤-82
	- 18Mbps	PER @ -82 dBm	≤-80
	- 24Mbps	PER @ -79 dBm	≤-77
	- 36Mbps	PER @ -75 dBm	≤-73
	- 48Mbps	PER @ -71 dBm	≤-69
	- 54Mbps	PER @ -70 dBm	≤-68
SISO Receive Sensitivity (11n,20MHz) @10% PER	- MCS=0	PER @ -87 dBm	≤-85
	- MCS=1	PER @ -84 dBm	≤-82
	- MCS=2	PER @ -82 dBm	≤-80
	- MCS=3	PER @ -79 dBm	≤-77
	- MCS=4	PER @ -75 dBm	≤-73
	- MCS=5	PER @ -71 dBm	≤-69
	- MCS=6	PER @ -70 dBm	≤-68
	- MCS=7	PER @ -69 dBm	≤-67
SISO Receive Sensitivity (11n,40MHz) @10% PER	- MCS=0,	PER @ -84 dBm	≤-82
	- MCS=1,	PER @ -81 dBm	≤-79
	- MCS=2,	PER @ -79 dBm	≤-77
	- MCS=3,	PER @ -76 dBm	≤-74
	- MCS=4,	PER @ -72 dBm	≤-70
	- MCS=5,	PER @ -68 dBm	≤-66
	- MCS=6,	PER @ -67 dBm	≤-65
	- MCS=7,	PER @ -66 dBm	≤-64
Maximum Input Level	802.11b : -8 dBm		
	802.11g/n : -20 dBm		

3.2 Bluetooth Specification

Feature	Description		
General Specification			
Bluetooth Standard	BLE		
Host Interface	UART		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2400 MHz ~ 2483.5 MHz		
Number of Channels	39 channels		
Modulation	GFSK		
RF Specification			
	Min(dBm)	**Typical**(dBm)	**Max**(dBm)
Output Power (Class 1)	1	5	9
Sensitivity @ BLE=30.8% for GFSK (1LE)		-89	
Maximum Input Level	GFSK (1Mbps):-20dBm		

Bluetooth power is determined by customer driver and does not undergo power calibration.

4. ID setting information

WI-FI

Vendor ID	TBD
Product ID	TBD

5. Pin Definition

5.1 Pin Outline

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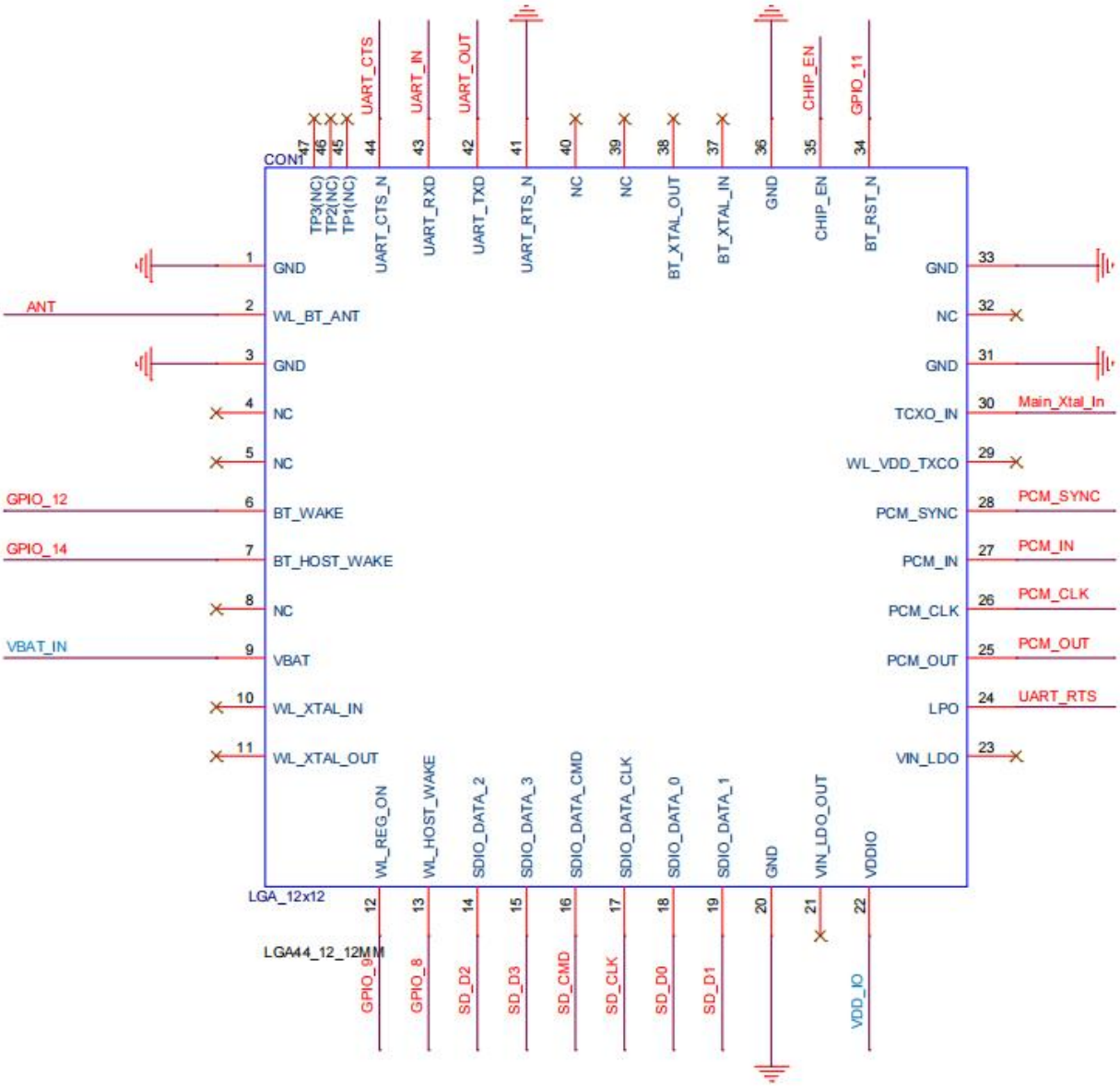


5.2 Pin Definition details

NO.	Name	Type	Description	Voltage
1	GND		Ground connections	
2	WL_BT_ANT	I/O	RF I/O port	
3	GND	-	Ground connections	
4	NC	-	Floating (NC)	
5	NC	-	Floating (NC)	
6	GPIO_12	I	Host to wake up device	VDDIO
7	GPIO_14	O	Shared with GPlO14 This pin is shared with either WiFi or BT functions to wake up the host when the remote wake function is enabled. The polaritycan be defined by the customer. This Wakeup pin can be configured as shared wake up pin by both WL and BT when any of WL and BT function issue the wake signal to the host.	VDDIO
8	NC		Floating (NC)	
9	VBAT_IN	P	3.3±10% V Main power voltage source input	3.3V
10	NC	-	Floating (NC)	
11	NC	-	Floating (NC)	
12	GPIO_9	I	Pull high: ON , Pull low: OFF External pull low can disable WL When BT DISn is also deasserted,will enter the whole chip reset state.	3.3V
13	GPIO_8	O	General Purpose Input/Output Pin	VDDIO
14	SD_D2	I/O	SDIO data line 2	
15	SD_D3	I/O	SDIO data line 3	
16	SD_CMD	I/O	SDIO command line	
17	SD_CLK	I	SDIO clock line	
18	SD_D0	I/O	SDIO data line 0	
19	SD_D1	I/O	SDIO data line 1	
20	GND	-	Ground connections	
21	NC	-	Floating(NC)	
22	VDDIO	P	I/O Voltage supply input	VDDIO
23	NC		Floating (NC)	
24	UART_RTS	I	UART RTS, module side is Ground connections	
25	PCM_OUT	O	PCM Output during power up don't pull high this pin	VDDIO
26	PCM_CLK	I/O	PCM Clock	VDDIO

27	PCM_IN	I	PCM Input	VDDIO
28	PCM_SYNC	O	PCM Sync	VDDIO
29	NC		Floating (NC)	
30	MAIN_XTAL_IN	O	Floating (NC)	
31	GND	-	Ground connections	
32	NC	-	Floating (NC)	
33	GND	-	Ground connections	
34	GPIO_11	I	Pull high: ON , Pull low: OFF External pull low can disable BT When WL DISn is also deasserted,will enter the whole chip reset state.	3.3V
35	CHIP_EN		Chip Enable default pull high.	
36	GND	-	Ground connections	
37	NC	-	Floating (NC)	
38	NC	-	Floating (NC)	
39	NC	-	Floating (NC)	
40	NC	-	Floating (NC)	
41	GND		GND	
42	UART_OUT	O	UART Output	VDDIO
43	UART_IN	I	UART Input	VDDIO
44	UART_CTS	I	UART CTS	VDDIO
45	NC	-	Floating (NC)	
46	NC	-	Floating (NC)	
47	NC	-	Floating (NC)	

P:POWER I:INPUT O:OUTPUT VDDIO:3.3V

6. Electrical Specifications

6.1 Power Supply DC Characteristics

The digital IO supports VDD33 or VDD18 application.

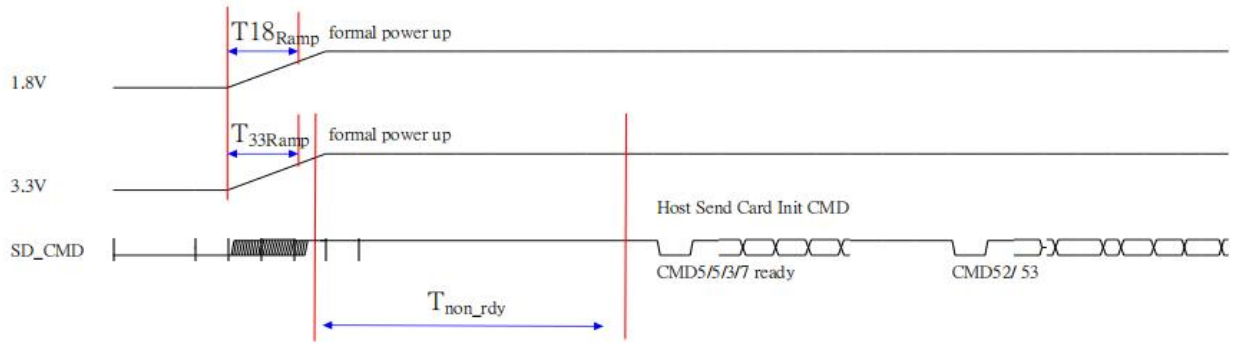
	MIN	TYP	MAX	Unit
Operating Temperature	0	25	70	deg.C
VCC33	3.0	3.3	3.6	V
VDDIO	1.62	1.8 or 3.3	3.6	V

6.2 Power Consumption

Power Consumption (Typical by using SWR)	Wi-Fi only: TX b mode 20MHz: 335 mA (max) RX b mode 20MHz: 80 mA (max) TX n mode 40MHz: 133 mA (max) RX n mode 40MHz: 53 mA (max) TX n mode 20MHz: 137 mA (max) RX n mode 20MHz: 47 mA (max) BT: TX: 101.8 mA (max) RX: 75.8 mA (max) IDEL: 50.5 mA (max)

6.3 SDIO Power-on sequence

After power-on, the SDIO interface is selected by the RTL8723DS automatically when a valid SDIO command is received. To attain better SDIO host compatibility, the following power-on sequence is recommended.



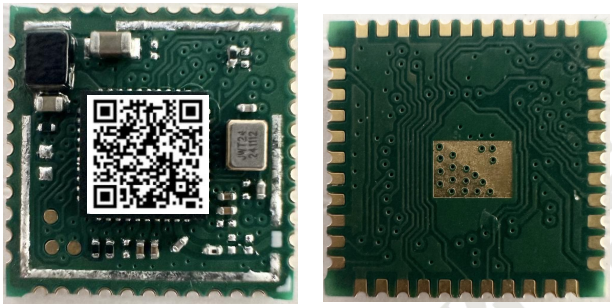
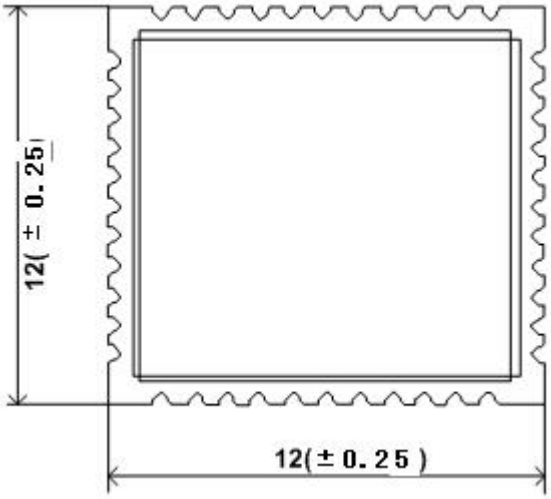
Symbol	Description
T_{33ramp}	The 3.3V main power ramp up duration.
T_{18ramp}	The 1.8V main power ramp up duration.
T_{non_rdy}	SDIO Not Ready Duration. In this state, the RTL8723BS-VC may respond to commands without the ready bit being set. After the ready bit is set, the host will initiate complete card detection procedure.

After main 3.3V ramp up and 1.8V ramp up, the power management unit is enabled by the power ready detection circuit. The power management unit enables the SDIO block. eFUSE is then autoloaded to SDIO circuits during the Tnon_rdy duration. After CMD5/5/3/7 procedures, card detection is executed. When the driver has loaded, normal CMD52 and CMD53 are used.

	Min	Typical	Max	Unit
T_{33ramp}	0.1	0.5	2.5	ms
T_{18ramp}	0.1	0.5	2.5	ms
$T_{non-rdy}$	1	2	10	ms

7. Size reference

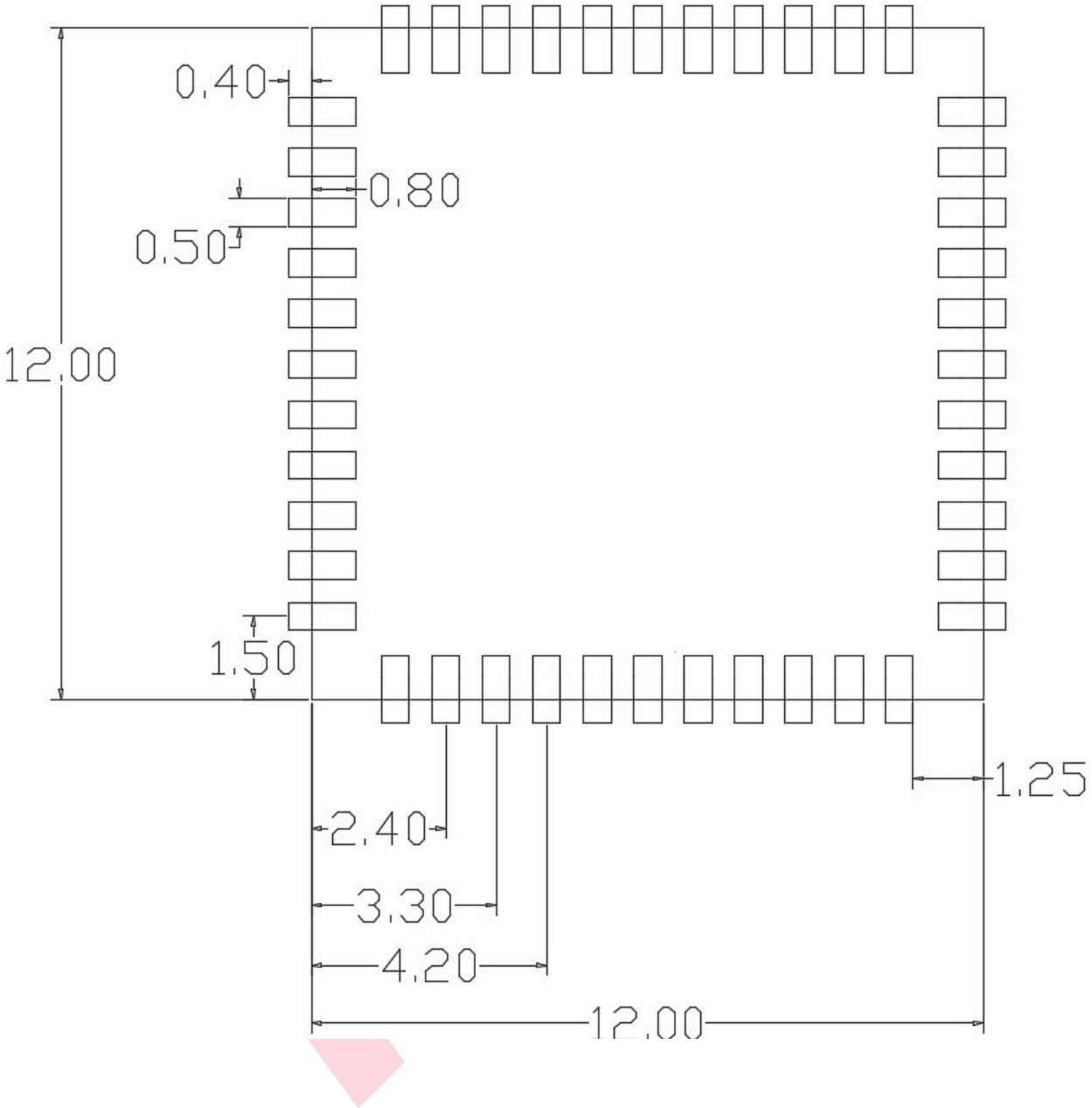
7.1 Module Picture

L x W : 12 x 12 (±0.2) mm 	
H: 1.8mm	
Weight	0.42g

7.2 Marking Description

< TOP VIEW >

7.3 Layout Recommendation



8. The Key Material List

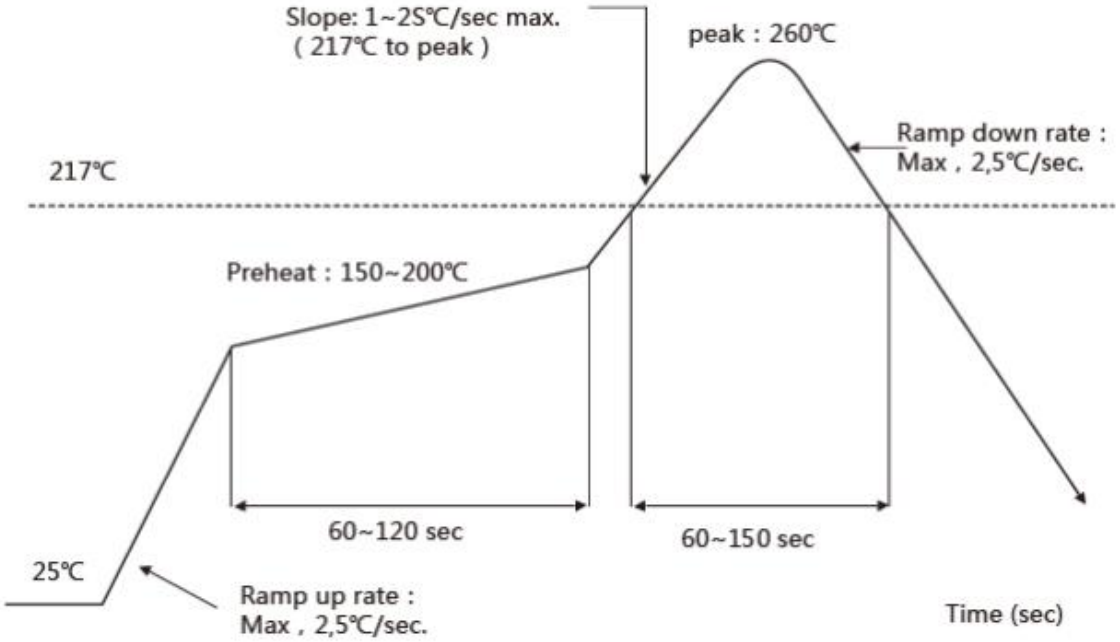
Item	Part Name	Description	Manufacturer
1	Chipset	RTL8723CS-CG QFN40 5X5mm	Realtek
2	PCB	FG6223ASRC 12X12mm 4L	ZL，SL，XY
3	Crystal	2016 24MHz 12pF 10ppm	TST,HOSONIC,TKD,ECEC,JWT
4	Inductor	2016 2.2uH ,±20%	Microgate,sunlord,cenke,ceaiya,INPAQ,Scientic

9. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <260°C

Number of Times : ≤2 times



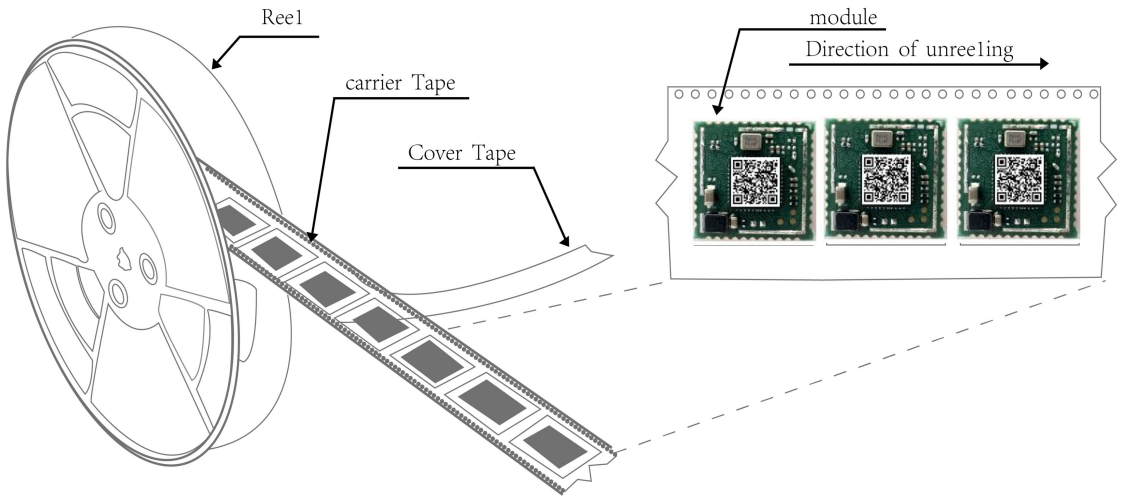
10. RoHS compliance

All hardware components are fully compliant with EU RoHS directive

11. Package

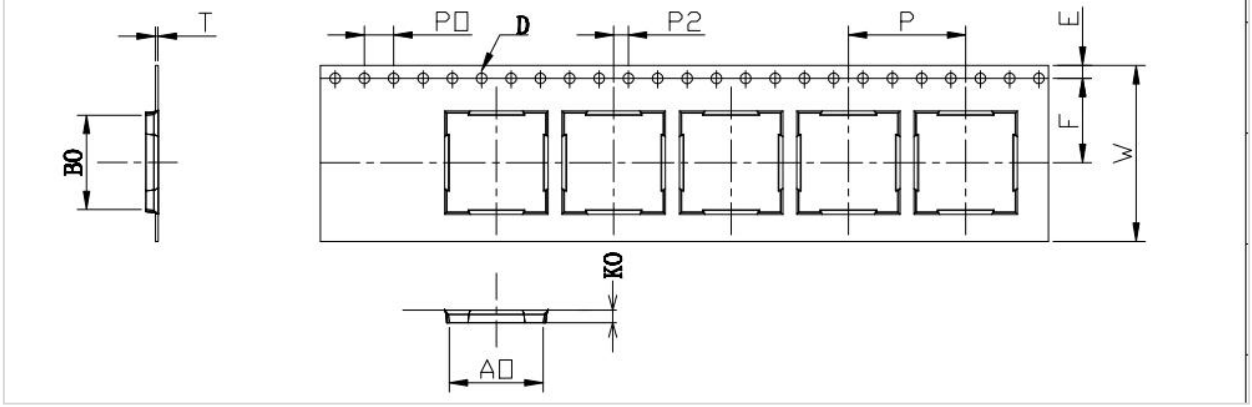
11.1 Reel

A roll of 1500pcs



11.2 Carrier Tape Detail

ITEM	W	A0	B0	D	F	E	K0	P0	P2	P	T
DIM	24	12.45	12.45	1.50	11.5	1.75	2.60	4.0	2.0	16.0	0.30
TOLE	+0.3 -0.3	±0.10	±0.10	+0.1 -0.0	+0.1 -0.1	±0.1	±0.10	±0.1	±0.1	±0.1	±0.05



11.3 Packaging Detail

the take-up package

Using self-adhesive tape

Size of black tape: 24mm*32.6m the cover tape :21.3mm*32.6m

Color of plastic disc: blue

NY bag size:450mm*415mm size ： 350*350*35mm

The packing case size:360*210*370mm

12. Moisture sensitivity

The Modules is a Moisture Sensitive Device level 3, in according with standard IPC/JEDEC J-STD-020, take care all the relatives requirements for using this kind of components.

Moreover, the customer has to take care of the following conditions:

a) Calculated shelf life in sealed bag: 12 months at <40°C and <90% relative humidity (RH)

b) Environmental condition during the production: 30°C / 60% RH according to IPC/JEDEC J-STD-033A paragraph 5

c) The maximum time between the opening of the sealed bag and the reflow process must be 168 hours if condition

d) “IPC/JEDEC J-STD-033A paragraph 5.2” is respected

e) Baking is required if conditions b) or c) are not respected

f) Baking is required if the humidity indicator inside the bag indicates 10% RH or more

Caution:

Use the Product in the environment with the temperature Between 0℃ and 70℃; Otherwise, it may damage your product. Products can only be used below 2000m altitude

For the following equipment:

Product Name: Combo Module

Brand Name: /

Model No.: FG6223ASRC

FN-LINK TECHNOLOGY LIMITED

E-mail: jim@fn-link.com

hereby declares that this [Name: Combo Module, Model: FG6223ASRC] is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.

CE

The full text of the EU declaration of conformity is available at the internet address: www.xxx.com

This product is intended for sale and application in a business environment.

RED Article 10 2

-This product can be used across EU member states

RED Article 10 10

-The product is class 1 product, No restrictions

The RF distance between body and product is 20cm

Frequency Range:

Technical Characteristics	
Bluetooth	
Bluetooth Version:	Bluetooth V4.1(BLE Mode)
Frequency Range:	2402MHz-2480MHz
Max.RF Output Power:	7.32dBm (EIRP)
Wi-Fi(2.4GHz)	
Support Standards:	802.11b, 802.11g, 802.11n-HT20/40
Frequency Range:	2412-2472MHz for 802.11b/g/n(HT20) 2422-2462MHz for 802.11n(HT40)
Max.RF Output Power:	17.24dBm (EIRP)

2.2 List of applicable FCC rules

FCC Part 15.247

2.3 Specific operational use conditions

This product is a Single-modular transmitter policy independent of any host. Not applicable.

2.4 Limited module procedures

This product is a Single-modular transmitter. It is not a limited module. Not applicable.

2.5 Trace antenna designs

This product has a external antennas. Not applicable.

2.6 RF exposure considerations

This equipment complies with the FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of your body.

2.7 Antennas

This product has two external antennas. The antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

No.	Antenna Type	Frequency Range	Gain	Impedance
1	FPC Antenna	2402-2480MHz 2412-2462MHz	3.39dBi	50ohm

2.8 Label and compliance information

FCC ID label on the final system must be labeled with "Contains FCC ID: 2AATL-FG6223ASRC" or "Contains transmitter module FCC ID: 2AATL-FG6223ASRC".

2.9 Information on test modes and additional testing requirements

Contact FN-LINK TECHNOLOGY LIMITED will provide stand-alone modular transmitter test mode. Additional testing and certification may be necessary when multiple modules are used in a host.

2.10 Additional testing, Part 15 Subpart B disclaimer

To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. For

example, if a host was previously authorized as an unintentional radiator under the Supplier's Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that the after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with the host, FN-LINK TECHNOLOGY LIMITED shall provide guidance to the host manufacturer for compliance with the Part 15B requirements.

FCC Warning

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE 1: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

Note 1: This module certified that complies with RF exposure requirement under mobile or fixed condition, this module is to be installed only in mobile or fixed applications.

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

A fixed device is defined as a device is physically secured at one location and is not able to be easily moved to another location.

Note 2: Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user has no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

Note 3: The module may be operated only with the antenna with which it is authorized. Any antenna that is of the same type and of equal or less directional gain as an antenna that is authorized with the intentional radiator may be marketed with, and used with, that intentional radiator.

Note 4: For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

Note 5: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to pro vide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a pa rticular installation. If this equipment does cause harmful interference to radio or televisi on reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
— Reorient or relocate the receiving antenna.
— Increase the separation between the equipment and receiver.
— Connect the equipment into an outlet on a circuit different from that to which the rec eiver is connected.
— Consult the dealer or an experienced radio/TV technician for help.